Claims

1. A direction finding system incorporating a plurality of antennas (12) characterised in that the system (10) also includes:

5   a)   means (SW1) for determining individual antenna signal strengths;

        b)   combining means (SW2, P2, P3, SW3, 18) for deriving combined antenna signal strengths by forming combinations of first and second antenna signals derived from different antennas (12), wherein the second antenna signals are in two sets with signals in one set having a non-zero phase difference relative
10   to signals the other set; and

        c)   means for determining at least one emitter bearing from antenna signal strengths.

2. A direction finding system according to Claim 1 characterised in that the means for determining emitter bearing is arranged to derive covariance matrix elements from
15 antenna signal strengths and to determine emitter bearing therefrom.

3. A direction finding system according to Claim 1 characterised in that the means for determining emitter bearing is arranged to derive a relationship between antenna signal strengths and emitter bearing and to determine emitter bearing therefrom.

4. A direction finding system according to Claim 1 characterised in that the relative
20 phase difference is in the range 30 to 120 degrees, and the means (SW1) for determining individual antenna signal strengths and the combining means (SW2, P2, P3, SW3, 18) are arranged to enable successive signal strengths to be derived in successive steps.

5. A direction finding system according to Claim 1 characterised in that the relative
25 phase difference is substantially 90 degrees.

18

6.   A direction finding system according to Claim 5 characterised in that the combining means (SW2, P2, P3, SW3, 18) is arranged to combine antenna signals with equal gain magnitude and with equal and unequal phase.

7.   A direction finding system according to Claim 1 characterised in that the combining means incorporates phase shifting means (P3) switchable into and out of an antenna signal path.

8.   A direction finding system according to Claim 1 characterised in that the combining means incorporates an adder (18) having two inputs both switchably connected to individual signal paths extending to respective antennas (12).

9.   A direction finding system according to Claim 1 characterised in that:

   a)   the means for determining individual antenna signal strengths comprises a first multipole switch (SW1) having input poles (b, c, d, e) connected to receive signals from respective antennas (12);

   b)   the combining means (SW2, P2, P3, SW3, 18) incorporates a second multipole switch (SW2) having input poles (b, c, d, e) connected to receive signals from respective antennas (12) and a third multipole switch (SW3) for switching phase shifting means (P3) into and out of an antenna signal path extending via the second multipole switch (SW2); and

   c)   the combining means (SW2, P2, P3, SW3, 18) also incorporates adding means (18) for combining signals, the adding means being arranged to add an antenna signal in a first signal path extending via the first multipole switch (SW1) to another antenna signal in a second signal path extending via the second and third multipole switches (SW2, SW3).

10.   A method of direction finding using a plurality of antennas (12) characterised in that the method incorporates determining:

   a)   individual antenna signal strengths;

   b)   combined antenna signal strengths by forming combinations of first and second antenna signals derived from different antennas (12), wherein the

second antenna signals are in two sets with signals in one set having a non-zero phase difference relative to signals the other set; and

c)   at least one emitter bearing from antenna signal strengths.

11.   A method according to Claim 10 characterised in that the step of determining emitter bearing is implemented by deriving covariance matrix elements from antenna signal strengths and determining emitter bearing therefrom.

12.   A method according to Claim 10 characterised in that the step of determining emitter bearing is implemented by deriving a relationship between antenna signal strengths and emitter bearing and determining emitter bearing therefrom.

13.   A method according to Claim 10 characterised in that the relative phase difference is in the range 30 to 120 degrees and successive signal strengths are determined in successive steps.

14.   A method according to Claim 13 characterised in that the relative phase difference is substantially 90 degrees.

15.   A method according to Claim 10 characterised in that the step of forming combined antenna signal strengths combines antenna signals with equal gain magnitude and with equal and unequal phase.

16.   A method according to Claim 12 characterised in that the step of forming combined antenna signal strengths includes switching phase shifting means (P3) into and out of an antenna signal path.

17.   A method according to Claim 12 characterised in that the step of forming combined antenna signal strengths includes adding signals in signal paths extending switchably to different antennas (12).

18.   A method according to Claim 10 characterised in that:

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a)   the step of determining individual antenna signal strengths comprises
      switching signals from antennas (12) via a first path;

b)   the step of forming combined antenna signal strengths incorporates:

      i)   switching signals from antennas (12) via a first path for combining;

5   ii)   switching signals from antennas (12) via a switch selectable second
             path or a third path for combining, the third path being arranged to
             phase shift antenna signals therein relative to antenna signals in the
             second path; and

      iii)   adding a first path antenna signal to second and third path antenna
10   signals individually.